

Progress in breeding for resistance to multiple diseases and insects in tomato

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The Cornell tomato breeding programs have a special focus on control of multiple diseases and insect pests of tomato. The work leads to the development and release of germplasm or lines with superior resistance, as well as new methodologies (i.e. assays or PCR markers linked to resistance genes).

One tomato projects is focused on combined control of the three defoliating diseases of tomato: late blight, early blight, and Septoria leaf spot. Germplasm with genetic controls for early blight and late blight have been released. More recently, a strong source of tolerance to Septoria leaf spot has been characterize and is being transferred into a tomato background that possesses genetic control of late blight and early blight. We anticipate confirming germplasm possessing genetic control of all three diseases by the end of the 2009 growing season. This combination of genetic controls targets all three major foliar pathogens, allowing extreme reduction in the use of fungicides in NE tomato projection, and facilitating NE organic tomato production. This project involves cooperation with Tom Zitter (Plant Pathology) and Chuck Bornt (Cornell Coop. Ext) to facilitate the identification of the best supplemental sprays to use with triple resistant germplasm, to provide superior plant protection with minimal environmental impact.

The second tomato project is focused on the genetic control and mechanisms for acylsugar-mediated insect resistance in tomato, and the combination of insect resistance with limited virus resistance genes to create stronger control of the major insect vectored viral diseases. Over 20 acylsugar producing lines were released in 2008, and comparison of these lines has revealed information regarding ways to manipulate acylsugar production. The first lines that combined insect resistance with virus resistance (Sw-5) will be completed with foundation seed production in the 2009 summer season. Acylsugar lines possessing Sw-7 and Ty-3 are also in development and should be completed by Spring 2010. Other portions of the acylsugar program have focused on creating lines with increased levels of acylsugars or modifying acylsugar structure to increase pest control levels, or modifications to improve horticultural type of the lines.